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(54) **Prioritized load balancing among non-communicating processes in a time-sharing system**

(57) A method and apparatus for prioritized load-balancing among non-communicating processes in a time-sharing system involves a Load Balancing Repository (LBR) which interfaces with each process that is actively addressed by the CPU. A scheduler within each process provides the LBR with a load distribution for that process representing the ratio of high-priority sub-task load to low-priority sub-task load. The LBR determines a target ratio in the form of an aggregate load distribution

ratio. The target ratio is reported back to each active process. For processes which are occupied with a relatively low proportion of high priority sub-tasks and which therefore exhibit a load distribution that is below the target ratio, the process scheduler will give up a portion of the time slice allotted to that process by the operating system when the load distribution of that process reaches the target ratio. Thus, CPU resources will be applied more frequently to processes which are occupied with a relatively high proportion of high priority sub-tasks.

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	ECONOMIDES A A ET AL: "Priority load sharing; an approach using Stackelberg games" PROCEEDINGS TWENTY-EIGHTH ANNUAL ALLERTON CONFERENCE ON COMMUNICATION, CONTROL AND COMPUTING, MONTICELLO, IL, USA, 3-5 OCT. 1990, pages 674-683, XP002102311 1991, Urbana-Champaign, IL, USA, Univ. Illinois, USA * page 674, line 1 - page 675, line 23 * * page 676, line 8 - line 29 *	1,6,10, 15	G06F9/46
A	SINHA A B ET AL: "A load balancing strategy for prioritized execution of tasks" PROCEEDINGS OF SEVENTH INTERNATIONAL PARALLEL PROCESSING SYMPOSIUM (CAT. NO. 93TH0513-2), NEWPORT, CA, USA, 13-16 APRIL 1993, pages 230-237, XP002102312 ISBN 0-8186-3442-1, 1993, Los Alamitos, CA, USA, IEEE Comput. Soc. Press, USA * page 230, left-hand column, line 33 - line 43 * * page 232, right-hand column, line 23 - page 233, left-hand column, line 34 * * page 233, right-hand column, line 16 - page 234, left-hand column, line 30 * --- -/--	1,6,10, 15	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 May 1999	Examiner Michel, T
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document Z : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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## EUROPEAN SEARCH REPORT

Application Number  
EP 99 30 0046

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	SEUNG HO CHO ET AL: "Dynamic load sharing algorithm with a weighted load representation" PROCEEDINGS OF THE THIRTEENTH ANNUAL ACM SYMPOSIUM ON PRINCIPLES OF DISTRIBUTED COMPUTING, PROCEEDING OF 13TH ACM SYMPOSIUM ON PRINCIPLES OF DISTRIBUTED COMPUTING, LOS ANGELES, CA, USA, 14-17 AUG. 1994, page 385 XP002102313 ISBN 0-89791-654-9, 1994, New York, NY, USA, ACM, USA * the whole document *	1,6,10, 15	
A	US 5 031 089 A (LIU HOWARD T ET AL) 9 July 1991 * abstract *	1,6,10, 15	
A	EP 0 366 344 A (AMERICAN TELEPHONE & TELEGRAPH) 2 May 1990 * abstract *	1,6,10, 15	
TECHNICAL FIELDS SEARCHED (Int.Cl.6)			
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 May 1999	Examiner Michel, T
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after, the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ON EUROPEAN PATENT APPLICATION NO.

EP 99 30 0046

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The members are as contained in the European Patent Office EDP file on  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5031089 A	09-07-1991	NONE	
EP 0366344 A	02-05-1990	CA 1318409 A	25-05-1993
		DE 68926564 D	04-07-1996
		DE 68926564 T	07-11-1996
		ES 2087081 T	16-07-1996
		JP 2178755 A	11-07-1990
		JP 2530918 B	04-09-1996
		US 5155858 A	13-10-1992

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